THE AUSTRALIAN PLANT DISEASE RECORDER.

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For private circulation to plant pathologists within Australia.

PLANT DISEASE NOTES.

VEGETABLES.

POTATO VIRUS A OR SOLANUM VIRUS 3:

Over the 10 years I have been associated with the problem of virus resistance in the potato I have come to the conclusion that virus A is a figment of the imagination. I would be grateful if someone could prove me wrong. Dr. J. G. Bald and Mr. A. T. Pugsley described in C.S.I.R. Pamphlet No. 110 the typical symptoms of virus A in varieties like Carman, Up-to-Date, and Snowflake. The latter two varieties were found to have a top-necrotic reaction to virus A. The top-necrotic reaction of grafted Up-to-Date scions is a standard test for virus A.

I have done four to five hundred grafts altogether. These have been made to tobacco, and both ways in potato in an endeavour to locate typical virus A in Australian varieties and specially imported material like Golden Wonder alleged by the senders to contain this virus. All tests have been negative although the addition of virus X was made in a large number of the tests to intensify the reaction to virus A.

As a result of my experience I have concluded that virus A need not be considered a problem in potato breeding. The rather bright yellow mottles which occur at times in varieties like Carman appear to be due to aberrant strains of virus X.

C.S.I.R.O.
Canberra.

- E.M. HUTTON.

TOP NECROSIS AND WILT OF BROAD BEANS:

While investigating viruses affecting peas in the Sydney district a specimen was obtained with a distorted stem apex, short internodes, and rosette in appearance. The presence of a virus was suspected, and sap transmissions were successfully made to broad bean and *Datura stramonium*. On the former a diffuse chlorotic mottle resulted, followed by top necrosis in some cases. On the latter small zoned necrotic lesions were produced. Subsequently a specimen of broad bean

was found showing severe top necrosis. Sap transmissions from this plant also produced small zoned necrotic local lesions on Datura stramonium.

Isolates from both pea and broad bean caused stunting and a chlorotic mottle on the pea varieties , Gem and Greenfeast. Both also caused a pronounced mottle on crimson clover, but there was no transmission to red clover, tobacco or Nicotiana glutinosa. In all cases the isolate from broad bean caused severe black top necrosis followed by wilting and death of inoculated broad bean plants.

From a review of the literature it appears that both viruses resemble closely the so-called "vascular wilt virus disease of broad bean", described by Stubbs. (J. Vic. Department of Agric. 45 : 323-332, 1947). However, some differences were observed. No chlorotic spots or oakleaf patterns were produced on the new leaves of Datura stramonium. No necrotic rings were produced on tobacco and no necrotic rings or line patterns on Nicotiana glutinosa. On Burwood Prize tomato, irregular necrotic lesions were produced on the inoculated leaves, with limited vein necrosis radiating from these.

The isolates differed only in the severity of their reaction on broad beans. It is suggested that while differences in host range and symptoms are sufficient to warrant the recording of these virus isolates as differing from that described by Stubbs all may well be strains of one virus.

The incidence of top necrosis in broad beans is relatively high and during the present season appears to be a serious disease of this crop in the Sydney area.

Faculty of Agriculture, - D.J. GOODCHILD and N.H. WHITE
University of Sydney.

TOMATO LEAF DISTORTING VIRUS:

During the growing season many specimens of tomato plants exhibiting severe leaf distortion are received each year. The symptoms are quite distinct from hormone weed killer injury in that the thickened veins running almost parallel to the midrib of the leaf, which are so characteristic of hormone injury, do not occur.

The most striking symptom of the disease discussed here is the distortion of the leaves. General puckering occurs, and the serrations of the leaflets are cupped downwards giving

a "fern-leaf" effect, although the leaf area is actually only slightly reduced. An accompanying symptom is marked epinasty of the petioles and midrib, particularly of the terminal leaflets. Vein clearing occurs, but mottling is slight. Some infected plants have shown fasciation of the stems. The bottom flower trusses of staking varieties often fail to set fruit, and those fruit that set on top trusses are usually distorted with deep creases. The general growth of affected plants is stunted.

The symptoms suggested a virus disease. Cleft grafts using infected scions and rubbing with sap from infected plants readily transmitted the disease to healthy "Ailsa Craig" tomatoes. Mechanical transmission to Nicotiana tabacum var. Hickory Prior and N. glutinosa was also obtained. On Hickory Prior symptoms consisted of narrowing of the lamina, and faint chlorotic mottling with very faint ring spots. On N. glutinosa severe leaf puckering, marked mosaic and severe dwarfing occurred. These symptoms suggested Cucumis Virus I, but all attempts to transmit the virus mechanically from tomatoes to cucumber were unsuccessful. Insect transmission, using Macrosiphum gei, was then tried and the disease was successfully transmitted to cucumbers. The virus was later mechanically transmitted from the cucumbers infected by M. gei, to healthy cucumbers. The symptoms produced were characteristic of Cucumis Virus I.

Department of Agriculture, - G. C. WADE
Hobart.

DAMPING-OFF OF TOMATO SEEDLINGS:

During August and September, 1953, several cases of damping-off of tomato seedlings were reported from various localities in the Sydney Metropolitan Area. The condition has been more prevalent this Spring than for a few years and has been present in both nursery and grower-raised seedlings. Affected seedlings were showing a typical damping-off symptom, the stem at and just above soil level being collapsed and shrivelled and showing a brownish discolouration internally. From a number of samples isolations were made and in each case a species of Phytophthora was obtained.

Phytophthora cryptogea Pethybr. & Laff. has been found in New South Wales causing a collar rot of tomato plants and overseas such species as P. parasitica Dast., P. drechsleri

Tucker and others have been found as causes of tomato damping-off. Further work is being carried out to identify and establish the pathogenicity of the N.S.W. isolates and the results will be reported later.

Department of Agriculture,
Sydney.

- J. WALKER and W.S. SUTTON

FRUIT.

RIO GRANDE (FLORIDA) GUMMOSIS OF CITRUS:

In view of recent reports (Agric. Gaz. N.S.W., 62 : 280, 1951; A.P.D.R., 5 : 3 : 29, 1953) of the possible presence in Australia of the citrus disease known as Florida or Rio Grande gummosis, it is felt that the following comments may be of interest.

When asked for information on this disease, Dr. Edward O. Olson of the United States Department of Agriculture stated that the commercial importance of the disease had been "greatly exaggerated" and that in some instances the disorder had been confused with psorosis. On the basis of experimental inoculations the cause is attributed to Diplodia natalensis. "Diplodia inoculations in the wood reproduced the salmon-pink wood stain within 90 days, and the blister symptoms within 6 weeks. Since Diplodia is known to cause profuse gumming, a 'heartwood' stain and a pink pigment in the substrate at high temperatures, it seems reasonable that it is related to the disease, Rio Grande gummosis."

He discounts the virus theory on the basis that it is too easy to reproduce the disease symptoms with Diplodia. Disease incidence is related to stresses placed upon the tree, such as water or soil troubles, or pruning wounds that have exposed the wood to infection. In conclusion, he states that "in Texas, psorosis is far more hazardous to grapefruit than is Rio Grande gummosis. Given the best of care, trees with Rio Grande gummosis recover. Under the same conditions, psorosis-infected grapefruit trees decline and die."

The theory that Florida gummosis is caused by a virus of the psorosis type emanated from the late H. S. Fawcett, but it has not been supported by experimental evidence. Moreover, Fawcett recognized gummosis as distinct from psorosis. However, in fairness to those who subscribe to the virus theory, it should be pointed out that protagonists of the Diplodia theory have failed to explain why gummosis stops at the bud-union when the stock is sour orange, as this species is susceptible to infection with D. natalensis.

In 1951, severe gumming was reported on several citrus species in a grove at Redcliffs, Victoria. The gummosis condition developed after the grove had been heavily top-dressed with sheep manure. Psorosis leaf-pattern symptoms were not observed in the field and seedling indicators patch-grafted from affected scions failed to react. The health of trees in this grove has gradually

improved, and it is thought that gummosis in this instance was related to nutrition rather than a pathogen.

In 195 2 a very severely affected Valencia tree 30-40 years old was reported at Merbein. The first indication of disease occurred with a profuse exudation of gum which extended into the main branches on one side of the tree. When first inspected by the writer, in June 1952, gumming had ceased but bark scaling and erumpent pustules occurred even on young twigs. Budwood from this tree has severely dwarfed sweet and sour orange seedling indicators, but so far without leaf-pattern symptoms. Should these symptoms develop, the disease would fit into the Psorosis B category as described by Fawcett.

It has been reported that a form of psorosis, which extends into the young branches and twigs, is widespread in Queensland (Qld. Agr. J. 76 : 2 : 68-75, 1953) and the suggestion has been made that an insect vector may be involved in its transmission. The possibility of a similar form of disease, with perhaps a less active vector in southern citrus areas, should not be overlooked.

Department of Agriculture, - L.L. STUBBS
Melbourne.

KNOBBY BARK OF CITRUS:

This disease, the cause of which is unknown, produces woody gall-like swellings on branches of citrus trees. They are often, though not exclusively associated with nodes, the swellings first becoming evident on year-old wood, and increasing in size with age. In the specimens seen all the branches carry these growths at close intervals throughout their length. In the past very few trees affected with this condition have been reported but in the course of a recent search for gall-wasp carried out by Entomologists of the N.S.W. Department of Agriculture two areas were found (Dee Why and Mangrove Creek) where almost all of the rough lemon seedling trees examined were affected. In the Dee Why area the trees were cultivated in home gardens, at Mangrove Creek where the incidence of infection appeared to be 100%, the trees were growing in a natural grove along a roadway. The galls are solid woody botryose structures covered with normal bark.

Department of Agriculture, - LILIAN R. FRASER
Sydney.

FUSARIUM WILT OF PASSIONFRUIT

A wilt of passionfruit considered to be identical with that which has been known for some years in Southern Queensland (McKnight, T.; Q'ld. J. Agr. Sci. 8 : 1, 1951) was recently detected in N.S.W. Specimens of affected plants were received from the Mangrove Mountain district in May and from the Taree district in June. Three plants in a plantation of 1,000 were reported to be affected at Mangrove Mountain and about 100 in a planting of 500 at Taree. The plants were carrying their first crop and had suddenly wilted. Both specimens showed a prominent brown discolouration of the vascular system, extending to the extremities of the canes. A strain of *Fusarium oxysporum* was isolated from the specimens which on inoculation of the soil caused the basal leaves of young passionfruit seedlings to yellow and drop after one month. The vascular tissues of the seedlings showed little discolouration but the pathogen could be re-isolated from their upper stems. It is known that the Science Branch, Department of Agriculture and Stock, Queensland, is at present engaged in determining the identity of the strain of *F. oxysporum* which causes passionfruit wilt in that State.

Department of Agriculture,
Sydney.

- C.J. MAGEE

BROWN ROT OF STONE AND POME FRUITS IN CANBERRA IN 1953:

Total loss by brown rot of a potential crop of nectarines estimated at two cases, occurred on a tree in a Canberra home orchard during February, 1953. No rain fell on, nor was any water supplied to, the tree for some six weeks previous to, or during, ripening. Almost total loss of crops of peaches and nectarines occurred in other home gardens. Within 30 yards of two such nectarine trees there were two others on which the loss was negligible. No insect injury was associated with the rotting.

Brown rot was also observed on one dozen pears collected either directly from the trees or from the ground in four home orchards. On each of these 12 pears the rot was associated with extensive injury by codling moth.

C.S.I.R.O.,
Canberra.

- H.R. ANGELL

ORNAMENTALS.

SCLEROTINIA STEM ROT OF ANTIRRHINUM:

During July, an Antirrhinum plant showing the development of a fungal stem rot was received from Taree, on the North Coast of New South Wales. The rot, which was of a soft, light brown nature, was developing on the stem about 6 inches above soil level. A white mycelium had developed on the rotted area and large, black sclerotia, characteristic of *Sclerotinia sclerotiorum* (Lib.) De Bary were present. This rotting of the upper stem caused by *Sclerotinia* is also seen in lupins, dahlias and other plants and appears to be caused from infection by airborne ascospores. This is the first record of *Sclerotinia sclerotiorum* attacking Antirrhinums in N.S.W.

Department of Agriculture,
Sydney.

- J. WALKER

MISCELLANEOUS PLANTS.

DIEBACK IN PINUS SPP. IN VICTORIAN PLANTATIONS:

Several occurrences of dieback, or deadtop, have been recorded in the last decade in Victorian pine plantations, the most severe being in 1944 and 1951. It was during the latter severe onset that the authors first surveyed plantations at Ovens, Bright, Stanley, Beechworth and Scarsdale, and became aware of several aspects in common associated with dieback at each locality.

The earliest symptoms occur about the end of February when wilting of the leader-tip growth is seen. This is followed by death of the affected parts and may extend to as much as the topmost few feet of the tree. In the late autumn the affected tree top assumes a characteristic reddish brown appearance. Usually, dieback is arrested in the following or subsequent years and new leader growth takes over. Trees showing regrowth since 1944 have continued to make healthy growth on sites where thinning has since been practised. On numerous occasions when dead material from dieback portions of affected trees was examined, pycnidia of Diplodia pinea (Desm.) Kickx were found occurring in ranks along bark furrows in twigs and branches and on needles and cones. As this fungus was found at large on dead and decaying pine material in the plantations, it was not regarded as a prime cause of dieback and other possible agencies were sought.

P. radiata and P. ponderosa are the dominant species in the plantations and both are subject to dieback. Mostly trees over twenty years of age were affected, but the range extended from a six year old case to trees between thirty and forty years. Several factors relating to growing conditions on many of the sites appear to have considerable bearing on the onset and development of this disorder and these drew attention during the survey.

It was established that dieback was most prevalent in unthinned compartments where tree competition was high, and that the majority of these compartments were located on steep hillside slopes, having a north-east to north-west aspect, subject to heat and wind in summer. Thinned compartments having the same aspect were much less affected.

A feature of many slopes was the shallow soil, there being only the top few inches over parent granite rock which outcropped extensively. By contrast with these unthinned sites on steep slopes and shallow soils, other unthinned sites were seen on deep alluvial soil flats without any signs of dieback.

There is much evidence which points to unfavourable sites in plantations and it is very likely that trees in unthinned compartments on these sites are subject to moisture stress periods, particularly during the summer months. An examination of annual ring growth from trees in one such compartment bears out this point and signs of restricted growth in 1944 and 1951 were much in evidence.

Department of Agriculture,
Melbourne.

- C.R. MILLIKAN and
R.D. ANDERSON

THE REPRODUCTION OF DIEBACK SYMPTOMS IN PINUS RADIATA UNDER SUMMER GLASSHOUSE CONDITIONS:

Field observations on the occurrence of dieback in *Pinus spp.* in Victorian plantations indicated the possibility of the condition being related to moisture stress during the summer. To test this hypothesis thirty-two, three year old *P. radiata* trees were prepared by growing from the transplant stage for twelve months in drums each with a known weight of soil from the Ovens plantation. The relevant soil moisture determinations were made prior to the commencement of the work.

Half the plants were grown at approximately 60% of field moisture capacity, while the other half were given an initial water diet equivalent to 30% field moisture capacity, but were not watered at all after the beginning of January when high summer temperatures occurred. After 8-10 weeks under summer glasshouse conditions, several of the low moisture series plants showed incipient wilting and by the end of March all sixteen exhibited dieback symptoms typical of the condition seen in the field plantations. During the same period the control trees remained healthy and grew considerably.

At the onset of incipient wilting soil moisture was found to range from 12-20% of field moisture capacity. Immediately wilting occurred the soil moisture level was raised to that of the control trees (60% F.M.C.) Six months later two of the dieback trees were dead; the remaining fourteen had shown extensive fresh growth immediately below the dead top and in five cases new leaders were evident.

Consideration was given to the possibility of *Diplodia pinea* having some causal part in dieback. Concurrent with the above experiment the uninjured leaders of half the

trees in each moisture series were inoculated with an homogenized hyphal suspension of D. pinea and humid conditions maintained for 24 hours by polythene bag covers. No infections occurred on either series of inoculated trees.

From the above experiment and field observations the authors are of the opinion that a period of high moisture stress in unthinned trees growing on "difficult" sites in Victorian plantations is the factor largely responsible for the onset of dieback.

Department of Agriculture,
Melbourne.

- C.R. MILLIKAN and
R.D. ANDERSON

MISCELLANEOUS NOTES

RHIZOPUS ARRHIZUS IN QUEENSLAND:

A fungus isolated by R. B. Morwood and causing a pre-emergence rot of peanut in Queensland has been identified as Rhizopus arrhizus Fischer. Examination of culture collections in this laboratory has revealed that this fungus also causes a rot of apricot and that the organism isolated from apricot can cause the peanut pre-emergence rot. Isolates from papaw, custard apple and bean were identified as R. nigricans Ehrnb.

Inoculations were made to some recognised and some suspected hosts with both R. arrhizus (isolated from peanut) and R. nigricans (isolated from papaw). A wound inoculation technique was used and material held in a moist chamber at room temperature (approximately 20°C). After seven days, positive results were obtained with both species on tomato, strawberry, papaw, and custard apple. On bean, infection by R. arrhizus was slight compared with R. nigricans.

In most cases mycelial growth of R. arrhizus was slower than that of R. nigricans. This is thought to be due to the difference in infection behaviour of the two organisms with respect to temperature (optimum temperature for infection by R. arrhizus is reported to be 32 - 35°C and for R. nigricans 18 - 24°C).

Both R. arrhizus and R. nigricans have a large and somewhat similar host range. Because of the higher temperature requirements of the former it is thought that it may be implicated more frequently than has been previously suspected in market losses in the summer months.

Department of Agriculture,
Brisbane.

- G.D. BOWEN

HYMENOGASTER SP:

Recently, specimens of a fungus dug up from a Sydney suburban rose garden were received for examination. They were found occurring at a depth of about 6 inches and superficially consisted of reddish-brown, irregularly shaped sclerotium-like bodies, from 0.5 to 2.5 in. wide. They had a characteristic

aromatic smell. On sectioning, these bodies were found to consist of an outer peridium of brown hyphae, surrounding a finely porous centre, masses of spores being borne in the cavities. These spores were single-celled, elliptical, often with a slight umbonate projection at one end, shortly pedicillate, smooth walled and light brown in colour. In size, they were about 12-16 μ long and 8-10 μ wide. The organism was identified as a member of the Hymenogastraceae, possibly a species of Hymenogaster. The family is an interesting one in containing some of the more primitive Gasteromycetes and in the fact that one genus, Rhizopogon, is known to form a beneficial mycorrhiza with some Pinus species. (Cunningham, G.H.: The Gasteromycetes of Australia and New Zealand, 1944).

Department of Agriculture, Sydney. - J. WALLER.

DOES THE SPOTTED-WILT VIRUS CHANGE IF KEPT IN TOMATO PLANTS FOR A RELATIVELY LONG PERIOD?

Twelve young Bonny Best tomato plants were inoculated with a standard inoculum containing a mixture of spotted-wilt strains. The inoculum was shown to contain the tip blight, necrotic and ringspot components in high concentration by inoculation to petunia, Nicotiana glutinosa, Datura stramonium, and Physalis floridana. Five months later the tips of each of the Bonny Best tomato plants were inoculated to paired leaves of young plants of the series of indicators mentioned. The sumptoms and the number of lesions resulting were noted. It was obvious that none of the strains of spotted wilt had been lost, but that their concentration differed markedly in the old Bonny Best plants. In half the Bonny Best plants virus concentration was apparently at a low level, and in the rest it was at a level comparable to that found in young infected plants. The results in Physalis floridana should be mentioned, as in seven of them inoculated from seven of the Bonny Best plants at the end of the experiment, the reactions to spotted wilt were localised, while in the rest there occurred systemic necrosis followed by a lethal collapse.

C.S.I.R.O., Canberra. - E.M. HUTTON.

DOES SPOTTED-WILT CHANGE WHEN PASSED THROUGH CHICK WEED (STELLARIA MEDIA)?

Holmes (Phytopathology 38 : 467-473, 1948) found that in New Jersey, Stellaria media was the intermediate host of tomato spotted-wilt. Two Argentinian varieties, Manzana and Rey de los Tempranos were shown by Holmes to be resistant to the spotted wilt strains present in New Jersey. In Australia, Manzana proved to be quite susceptible to spotted-wilt, while Rey de los Tempranos had a high resistance. It was considered of interest to see whether passage of spotted-wilt through Stellaria media had any effect on the virus and the resultant reactions of these two tomato varieties. A standard inoculum containing a mixture of spotted-wilt strains was inoculated to twelve S. media plants. The S. media plants developed white ring spots and a mottle in three weeks. A month from inoculation they were each inoculated to plants of N. glutinosa, petunia, Datura stramonium, Pearl Harbor, Manzana, Rey de los Tempranos, Lycopersicum pimpinellifolium, and Bonny Best. At the same time the standard spotted-wilt inoculum, which had been kept in young tomato plants, was transferred to further plants of this series of indicators. The results clearly showed that passage of the spotted wilt through S. media had not affected its strain composition or its effects on the different host indicators used.

C.S.I.R.O.,
Canberra.

- E.M. HUTTON

COMMONWEALTH MYCOLOGICAL INSTITUTE NOTES.

FIFTH COMMONWEALTH MYCOLOGICAL CONFERENCE:

The proposal to hold the fifth Commonwealth Mycological Conference in London during July 16-23, 1954, is at present under discussion. Plant pathologists are invited to submit suggestions for the agenda either to the Director or to me as Official Correspondent of C.M.I. in Australia.

The fourth Commonwealth Mycological Conference was held in London in 1948 and a report of the Conference was published the same year. Discussions at the 1948 Conference included the following:-

1. Administrative measures against plant diseases -

   (a) Legislation.

   (b) Seed certification against seed borne diseases.

2. Control of virus diseases -

   (a) Swollen shoot disease of cacao.

   (b) Stone fruit virus diseases in Canada.

   (c) Control of "phloem necrosis" of tea in Ceylon.

   (d) Tomato spotted wilt virus.

3. Control of virus diseases (certification of vegetatively reproduced crops) -

   (a) Control of potato viruses by certification.

   (b) Virus disease problems in the certification of fruit and hops.

4. The diagnosis of nutritional disorders.

5. Losses due to fungi in stored foodstuffs.

6. Certification of fungicides.

7. The use of fungicides in the control of tropical plant diseases.

8. The development of new fungicides.

9. Recent developments in pest and disease control machinery.

10. Application of insecticides and fungicides from the air.

11. Biological control of insects and weeds.

12. Forest pathology.

Several papers were also read dealing with the organisation and work of C.M.I.

Department of Agriculture,
Sydney.

- C.J. MAGEE